CLAIMS

What is claimed is:

1. A density measuring apparatus comprising:
   a pipeline having a bore for the flow of fluid, wherein the pipeline further comprises:
   an inlet pipe;
   an outlet pipe located downstream from the inlet pipe; and
   a densimeter, the densimeter having a first end and a second end, wherein the first end is flexibly joined to the inlet pipe, and the second end is flexibly joined to the outlet pipe.

2. The apparatus of claim 1, wherein the densimeter extends in a non-vertical direction.

3. The apparatus of claim 1, wherein the longitudinal axis of the densimeter is substantially straight from the first end of the densimeter to the second end.

4. The apparatus of claim 1, wherein the cross-sectional area of the densimeter is uniform for the entire length of the densimeter extending from the first end to the second end.

5. A density measuring apparatus comprising:
   an inlet pipe having a downstream end;
   a second pipe having an upstream end and a downstream end, wherein the upstream end of the second pipe is in register with and flexibly connected to the downstream end of the inlet pipe;
   an outlet pipe having an upstream end, wherein the upstream end of the outlet pipe is in register with and flexibly connected to the downstream end of the second pipe; and

a weight measuring unit capable of measuring the weight of the second pipe.

6. The apparatus of claim 5, wherein the weight measuring unit is positioned below the second pipe and is capable of supporting the weight of the second pipe.

7. The apparatus of claim 6, wherein the weight measuring unit comprises at least one compression-type load cell.

8. The apparatus of claim 5, wherein the weight measuring unit is positioned above the second pipe and is capable of supporting the weight of the second pipe.

9. The apparatus of claim 8, wherein the weight measuring unit comprises at least one tension-type load cell.

10. The apparatus of claim 5, wherein the second pipe extends in a non-vertical direction.

11. The apparatus of claim 5, wherein the longitudinal axis of the second pipe is substantially straight from the upstream end of the second pipe to the downstream end.

12. The apparatus of claim 5, wherein the longitudinal axis of the second pipe is curved from the upstream end of the second pipe to the downstream end.

13. The apparatus of claim 5, wherein the cross-sectional area of the second pipe is uniform for the entire length of the second pipe extending from the upstream end to the downstream end.

14. The apparatus of claim 5, wherein the cross-sectional area of the second pipe is not uniform for the entire length of the second pipe extending from the upstream end to the downstream end.

15. A measuring system capable of determining the density of a fluid as it continuously flows through a pipeline, the measuring system comprising:

a densimeter having a first end and a second end, the second end of the densimeter being located a selected distance downstream from the first end of the densimeter;

a first flexible connector, wherein the first flexible connector joins the first end of the densimeter to an inlet section of the pipeline so that the first end of the densimeter can move radially with respect to the inlet section;

a second flexible connector, wherein the second flexible connector joins the second end of the densimeter to an outlet section of the pipeline so that the second end of the densimeter can move radially with respect to the outlet section;

a weight measuring unit capable of measuring the weight of the densimeter as the fluid passes through the densimeter; and

a control unit adapted to calculate the density of the fluid based on the weight of the densimeter.

16. The measuring system of claim 15, wherein the weight measuring unit is positioned below the densimeter and is capable of supporting the weight of the densimeter.

17. The measuring system of claim 16, wherein the weight measuring unit comprises at least one compression-type load cell.

18. The measuring system of claim 18, wherein the weight measuring unit is positioned above the densimeter and is capable of supporting the weight of the densimeter.

19. The measuring system of claim 15, wherein the weight measuring unit comprises at least one tension-type load cell.

20. The measuring system of claim 15, wherein the densimeter extends in a non-vertical direction.

21. The measuring system of claim 15, wherein the longitudinal axis of the densimeter is substantially straight from the first end of the densimeter to the second end.

22. The measuring system of claim 15, wherein the cross-sectional area of the densimeter is uniform for the entire length of the densimeter extending from the first end to the second end.

23. A method of measuring the density of a fluid for use in an oil well, the method comprising the steps of:

    (a) flowing a first fluid having a known density through a pipeline;
    (b) calibrating a weight measuring unit that is capable of measuring the weight of a selected section of the pipeline as the first fluid flows through the selected section of the pipeline;
    (c) flowing a second fluid having an unknown density through the pipeline;
    (d) measuring the weight of the selected section of the pipeline as the second fluid flows through the selected section; and
    (e) using the control system to determine the density of the second fluid as the second fluid flows through the selected section of the pipeline.

24. The method of claim 23, wherein the control system continuously measures the density of the second fluid as the second fluid flows through the densimeter.

25. The method of claim 23, wherein the density of the second fluid is measured while the second fluid is in a process pipe on a shipping vessel.

26. The method of claim 25, wherein the shipping vessel is a truck.